

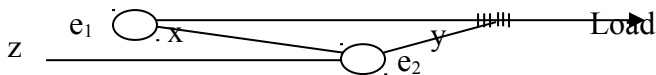
1) You are facing a 60' ice climb of consistent difficulty. You have three screws. From looking at the climb, you decide to place the screws at 15', 25' and 40'. You have two screamers and one regular draw. Which screw doesn't get a screamer and why?

A1: Top screw because it is the lowest fall factor.

A2: Bottom screw because a fall might not be fatal and you have the least chance of falling on it (10' of climbing above the 1st screw, 15' of climbing above the 2nd screw, and 20' of climbing above the 3rd screw).

2) In addition to your regular biners and prussiks, you have one pulley to use when setting a z-drag. Where do you put it and why?

A: (ratchet prussik not shown)



$e_1$  = efficiency of first turnaround point

$e_2$  = efficiency of second turnaround point

$x$  = tension on strand between two turnaround points

$y$  = tension on prussik

$z$  = pulling force

So:

$$e_2 z = x$$

$$z + x = y$$

$$e_1 x + y = \text{Load}$$

Note: This is a static solution, which is not appropriate for a dynamic z-drag, but should still give a good answer as to where we want the pulley.

Solving:

$$z = \text{Load} / (e_1 e_2 + e_2 + 1)$$

We want to minimize the pulling force,  $z$ , which means we need to put the pulley on the second turnaround point. For example, if the efficiency of a biner is 60% and the efficiency of a pulley is 95%, then for an 80kg load with the pulley on the first turnaround point we have to pull with a force of:

$$z = 80 / (.95 * .6 + .6 + 1) = 36.9\text{kg}$$

And with the pulley on the second turnaround point we have to pull with a force of:

$$z = 80 / (.6 * .95 + .95 + 1) = 31.7\text{kg}$$

In summary, the efficiency of the second turnaround point affects your pulling force twice, while the efficiency of the first turnaround point affects your pulling force once.

3) If the belayer leaves extra slack in the climbing rope, does this make for a harder or softer catch when the climber falls?

A: Slack at the belay makes the fall factor approach 1. Therefore the catch is harder for fall factor  $< 1$ , and softer for fall factor  $> 1$ .

4) Leading a multi-pitch climb, the climber places plenty of gear on the hard 5.10 crack she is climbing. Pulling through the 5.11 roof crux, the leader is now on a large, level ledge. The leader feels perfectly comfortable walking right 40' along this ledge to a tree where she can build and anchor and bring up the second. Is it necessary to place gear during this 40' stroll across a ledge?

5) Lost Arrow Spire scenario: Rappel 275 feet, climb two pitches. Rig a tyro from bomber anchor back to start point (across 60', up 30'). You have two ropes, two people, prussiks, ascenders, etriers, etc.

6) How do you multipitch rappel with a grigri?

7) You want to top rope a 120' tall ice climb. You have two 200' long ropes. How do you do it? What are the pros and cons of your solution?

8) You have just led a wicked hard sport climb with fixed draws. The climb is 120' tall. You are climbing on a 200' rope. How do you get down? What if you have a goose with you?

9) You are rappelling at the Gunks with a friend who is new to climbing. You place them on rappel and head down first to connect to the next anchor. Your friend comes down second. When your friend arrives at the anchor it is impossible to unscrew the locking carabiner attached to their rappel device. What do you do?

10) you forgot to bring a second harness for your top roping day. you figure you could belay off the ground, but there is absolutely nothing to tie off to at the base of the cliff. How do you still have a nice safe day of top roping without going home to get your harness?

11) You are doing a double rope rappel with two identical ropes. How do you know which to pull?

12) We usually recommend that people keep the tie-in knot close to their harness. Why?

13) How do you clean an overhanging sport route? Especially the bottom draw? Don't take your belayer for a horrible drag across the ground.

a) follow the route

b) lower and tram cleaning draws, clean the last draw from the ground with a stick clip

c) lower and tram, go direct to bolt #2, unclip tram, clean bolt #1, climb to failure, watch the swing

d) leave a biner on the bottom bolt or some mid-climb bolt as a redirect

e) anchor the belayer, lower and tram all the way to the ground cleaning draws as you go

14) While mountaineering, you encounter a 15-foot wide crevasse with no obvious or safe route around it. How do you cross it?